In the claims:

1. (Previously presented) A method of controllably forming a three-dimensional assembly of isolated nanowires, each nanowire comprising at least two materials within a matrix of an other material, said method comprising:

providing a substrate;

forming a two-dimensional catalyst array on a major surface of said substrate;

controllably growing in a third dimension an array of said nanowires corresponding with said catalyst array, said nanowires each comprising said at least two materials; and

forming the matrix of the other material that fills in spaces between said nanowires.

2 - 4. (Canceled)

5. (Previously presented) The method of Claim 1 wherein said isolated nanowires of the at least two materials comprise alternating regions of a first material and a second material, and wherein said matrix comprises a third material.

6. (Original) The method of Claim 5 wherein said first material is selected from the group consisting of silicon, germanium, GaAs, GaP, InAs, InP, mixed III-V compound semiconductor materials, CdS, CdTe, and mixed II-VI compound semiconductor materials, wherein said second material is selected from the group consisting of silicon, germanium, GaAs, GaP, InAs, InP, mixed III-V compound semiconductor materials, CdS, CdTe, and mixed II-VI compound semiconductor materials, and wherein said first material is different than said second material.

7. (Original) The method of Claim 6 wherein said third material is selected from the group consisting of silicon, germanium, GaAs, GaP, InAs, InP, mixed III-V compound semiconductor materials, CdS, CdTe, mixed II-VI compound semiconductor

materials, oxides, nitrides, and oxynitrides, and wherein said third material may be the same or different than either said first material or said second material.

8. (Original) The method of Claim 1 wherein said step of forming said catalyst array comprises:

providing a mold with nanoscale protrusions forming all the individual elements of a desired pattern;

coating said protrusions with a material containing said catalyst;

providing a substrate; and

transferring said catalyst to a major surface of said substrate, said major surface comprising a non-catalytic surface, to form a pattern of said catalyst on said major surface of said substrate.

9. (Original) The method of Claim 1 wherein said step of forming said catalyst array comprises:

imprinting a first line of material over a layer of said catalyst material;

etching to remove catalyst material where not protected;

imprinting a second line of material orthogonal to said first line; and

etching to remove catalyst material where not protected, so that said catalyst only remains where protected by both imprints.

10. (Previously presented) The method of Claim 1 wherein said step of growing said array of nanowires comprises:

introducing a gaseous source containing at least one of the at least two materials; and

allowing said gaseous source to react with said catalyst and diffuse therethrough or therearound, thereby causing precipitation of said at least one of the at least two materials, thereby forming said nanowires.

11. (Original) The method of Claim 10 wherein two materials are used to form said nanowires having alternating regions of a first material and a second material by:

introducing a first gaseous source containing said first material;

allowing said first gaseous source to react with said catalyst and diffuse therethrough, thereby causing precipitation of said first material, thereby forming one segment;

introducing a second gaseous source containing said second material;

allowing said second gaseous source to react with said catalyst and diffuse therethrough, thereby causing precipitation of said second material, thereby forming a second segment; and

alternating said first gaseous source and said second gaseous source to thereby form said nanowire comprising said alternating regions.

12. (Original) The method of Claim 11 wherein one of said gaseous sources comprises silane and said material precipitated is silicon and wherein another of said gaseous sources comprises germane and said material precipitated is germanium.

13. (Original) The method of Claim 1 wherein said step of forming said matrix comprises a non-catalytic method.

14. (Original) The method of Claim 13 wherein said matrix is formed by chemical vapor deposition or by directional filling using physical vapor deposition or by high-density plasma-enhanced chemical vapor deposition.

15. (Previously presented) A method of controllably forming a three-dimensional assembly of isolated nanowires of two materials within a matrix of one of said two materials, said method comprising:

providing a substrate;

forming a two-dimensional catalyst array on a major surface of said substrate;

controllably growing in a third dimension an array of said nanowires corresponding with said catalyst array, said nanowires each comprising alternating regions of said two materials; and

forming a matrix of one of said materials that fills in spaces between said nanowires.

16. (Original) The method of Claim 15 wherein said substrate comprises silicon, said nanowires comprise alternating regions of germanium and silicon, and said matrix comprises silicon.

17. (Original) The method of Claim 15 wherein said catalyst array comprises a metal that catalyzes growth of said nanowires from vapors comprising precursors of said two materials.

18. (Original) The method of Claim 17 wherein said metal comprises gold and wherein said vapors comprise germane and silane, alternately introduced to be catalyzed by said gold to form said alternating regions of germanium and silicon.

19. (Previously presented) The method of Claim 15 wherein said step of forming said catalyst array comprises:

providing a mold with nanoscale protrusions forming all the individual elements of a desired pattern;

coating said protrusions with a material containing said catalyst;

providing a substrate; and

transferring said catalyst to a major surface of said substrate, said major surface comprising a non-catalytic surface, to form a pattern of said catalyst on said major surface of said substrate.

20. (Previously presented) The method of Claim 15 wherein said step of growing said array of nanowires comprises:

introducing a first gaseous source containing a first material;

allowing said first gaseous source to react with said catalyst and diffuse therethrough, thereby causing precipitation of said first material, thereby forming one segment;

introducing a second gaseous source containing a second material;

allowing said second gaseous source to react with said catalyst and diffuse therethrough, thereby causing precipitation of said second material, thereby forming a second segment; and

alternating said first gaseous source and said second gaseous source to thereby form said nanowire comprising said alternating regions.

21. (Original) The method of Claim 20 wherein one of said gaseous sources comprises silane and said material precipitated is silicon and wherein another of said gaseous sources comprises germane and said material precipitated is germanium.

22. (Original) The method of Claim 15 wherein said step of forming said matrix comprises a non-catalytic method.

23. (Original) The method of Claim 22 wherein said matrix is formed by chemical vapor deposition or by directional filling using physical vapor deposition or by highdensity plasma-enhanced chemical vapor deposition.

24. (Previously presented) A two-dimensional assembly of isolated nanowires or segments of nanowires, each nanowire comprising at least two materials within a matrix of at least one other material, said isolated nanowires or segments of nanowires extending in a third dimension.

25 - 27. (Canceled)

28. (Original) The assembly of Claim 24 wherein said isolated nanowires of two materials comprise alternating regions of a first material and a second material and wherein said matrix comprises a third material.

29. (Original) The assembly of Claim 28 wherein said first material is selected from the group consisting of silicon, germanium, GaAs, GaP, InAs, InP, mixed III-V compound semiconductor materials, CdS, CdTe, and mixed II-VI compound semiconductor materials, wherein said second material is selected from the group consisting of silicon, germanium, GaAs, GaP, InAs, InP, mixed III-V compound semiconductor materials, CdS, CdTe, and mixed II-VI compound semiconductor materials, and wherein said first material is different than said second material.

30. (Original) The assembly of Claim 29 wherein said third material is selected from the group consisting of silicon, germanium, GaAs, GaP, InAs, InP, mixed III-V compound semiconductor materials, CdS, CdTe, and mixed II-VI compound semiconductor materials, oxides, nitrides, and oxynitrides, and wherein said third material may be the same or different than either said first material or said second material.

31. (Previously presented) A photonic bandgap structure comprising an assembly of isolated nanowire segments of a first material within a matrix of a second material.

32. (Original) The photonic bandgap structure of Claim 31 wherein said first material is selected from the group consisting of silicon, germanium, GaAs, GaP, InAs, InP, mixed III-V compound semiconductor materials, CdS, CdTe, and mixed II-VI compound semiconductor materials, wherein said second material is selected from the group consisting of silicon, germanium, GaAs, GaP, InAs, In P, mixed III-V compound semiconductor materials, CdS, CdTe, mixed II-VI compound semiconductor materials, oxides, nitrides, and oxynitrides, and wherein said said first material is different than said second material.

33. (Original) A quantum dot structure comprising nanowires comprising an array of controllably placed isolated segments of a first material surrounded on top and

bottom by a second material and on the sides by a matrix of a third material, which may be the same as said second material or another material other than said first material, the dimensions of said isolated segments being small enough to provide quantum confinement.

34. (Original) The quantum dot structure of Claim 33 wherein said first material and said second material are each independently selected from the group consisting of silicon, germanium, GaAs, GaP, InAs, InP, mixed III-V compound semiconductor materials, CdS, CdTe, and mixed II-VI compound semiconductor materials.

35. (Original) The quantum dot structure of Claim 34 wherein said third material is selected from the group consisting of silicon, germanium, GaAs, GaP, InAs, InP, mixed III-V compound semiconductor materials, CdS, CdTe, mixed II-VI compound semiconductor materials, oxides, nitrides, and oxynitrides, and wherein said third material is different than said first material and may be the same or different than said second material.

36. (Original) The quantum dot structure of Claim 35 wherein said first material comprises germanium and wherein said dimensions are of the order of 10 nm.

37. (Original) The quantum dot structure of Claim 33 wherein said isolated segments are controllably placed in all three dimensions.

38. (Previously presented) The method of Claim 1 wherein two or more layers of said matrix are formed.

39. (Previously presented) The assembly of Claim 24 wherein said matrix comprises two or more layers of materials.

40. (Previously presented) The photonic band gap structure of Claim 31 comprising a plurality of nanowires, each nanowire comprising two materials within a matrix of said second material, said isolated segments of nanowires extending in a third dimension, wherein one of said materials comprises said first material and wherein another of said materials comprises the same material as said second material, thereby providing said assembly of said isolated segments of said first material.